U. S. Steel Corporation
Minnesota Ore Operations
P.O. Box 217
Keewatin, MN 55753

October 26, 2004

Materials Licensing Branch
U. S. Nuclear Regulatory Commission
Region III
2443 Warrenville Road, Suite 210
Lisle, IL 60532-4352

REF: Renewal Application For License No. 22-05587-02
Expiration Date: November 30, 2004

Gentlemen:

Enclosed is an original and one copy of our application and supporting documentation for the renewal of License No. 22-05587-02 in its entirety.

We believe this application is complete for its intended purpose, and follows the requirements set out in NUREG-1554, Volume 4. However, should you have any questions, feel free to contact me at (218) 778-8736.

Thank you for your assistance.

Sincerely,

John M. Given

John M. Given
Radiation Safety Officer

Enclosures

NRC FORM 313 (4-2004) 10 CFR 30, 32, 33, 34, 35, 36, 39, and 40

U.S. NUCLEAR REGULATORY COMMISSION

APPLICATION FOR MATERIAL LICENSE

APPROVED BY OMB: NO. 3150-0120 **EXPIRES: 10/31/2005**

Estimated burden per response to comply with this mandatory collection request: 7 hours. Submittal of the application is necessary to determine that the applicant is qualified and that adequate procedures exist to protect the public health and safety. Send comments regarding burden estimate to the Records and FOIA/Privacy Services Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0120), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

DIVISION OF INDUSTRIAL AND MEDICAL NUCLEAR SAFETY
OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS:

IF YOU ARE LOCATED IN:

ALABAMA, CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, FLORIDA, GEORGIA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, MISSISSIPPI, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, NORTH CAROLINA, PENNSYLVANIA, PUERTO RICO, RHODE ISLAND, SOUTH CAROLINA, TENNESSEE, VERMONT, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

LICENSING ASSISTANCE TEAM
DIVISION OF NUCLEAR MATERIALS SAFETY
U.S. NUCLEAR REGULATORY COMMISSION, REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

MATERIALS LICENSING BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, IL 60532-4352

ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH, WASHINGTON, OR WYOMING, SEND APPLICATIONS TO:

NUCLEAR MATERIALS LICENSING BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TX 76011-4005

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S.NUCLEAR REGULATORY COMMISSION JURISDICTIONS.

1. THIS IS AN APPLICATION FOR *(Check appropriate item)*
   - [ ] A. NEW LICENSE
   - [ ] B. AMENDMENT TO LICENSE NUMBER
   - [X] C. RENEWAL OF LICENSE NUMBER 22-05587-02

2. NAME AND MAILING ADDRESS OF APPLICANT *(Include ZIP code)*
   Keewatin Taconite
   Minnesota Ore Operations, Div. of US Steel
   P. O. Box 217
   Keewatin, MN 55753-0217

3. ADDRESS WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED
   Keewatin Taconite
   Minnesota Ore Operations
   One Mine Road
   Keewatin, MN 55753

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION
   John M. Given
   TELEPHONE NUMBER
   (218) 778-8736

SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 X 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL
   a. Element and mass number; b. chemical and/or physical form; and c. maiximum amount which will be possessed at any one time.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING EXPERIENCE.

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

12. LICENSE FEES *(See 10 CFR 170 and Section 170.31)*
    FEE CATEGORY | AMOUNT ENCLOSED $ NA

13. CERTIFICATION. *(Must be completed by applicant)* THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, 36, 39, AND 40, AND THAT ALL INFORMATION CONTANED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

CERTIFYING OFFICER – TYPED/PRINTED NAME AND TITLE	SIGNATURE	DATE
John M. Given, Radiation Safety Officer	John M. Given	10/26/04

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED	CHECK NUMBER	COMMENTS
			$		
APPROVED BY				DATE	

Suggested Format for Providing Information Requested in Items 5 Through 11 of NRC Form 313

Table B.1 Items 5 & 6: Materials To Be Possessed and Proposed Uses

Yes	No	Radioisotope	Manufacturer or Distributor Model No.	Quantity	Use As Listed on SSD Certificate	Specify Other Uses Not Listed on SSD Certificate
	X	Cobalt-60	Sealed source manufacturer or distributor and model number: _____ Device manufacturer or distributor and model number: _____	Not to exceed either the maximum activity per source or maximum activity per device as specified in Sealed Source and Device Registration Certificate	Yes [ ] Specific description of the gauge use: _____	[ ] Not applicable _____ [ ] Uses are: _____ (Submit safety analysis supporting safe use)
	X	Krypton-85	Sealed source manufacturer or distributor and model number: _____ Device manufacturer or distributor and model number: _____	Not to exceed either the maximum activity per source or maximum activity per device as specified in Sealed Source and Device Registration Certificate	Yes [ ] Specific description of the gauge use: _____	[ ] Not applicable _____ [ ] Uses are: _____ (Submit safety analysis supporting safe use)
	X	Strontium-90	Sealed source manufacturer or distributor and model number: _____ Device manufacturer or distributor and model number: _____	Not to exceed either the maximum activity per source or maximum activity per device as specified in Sealed Source and Device Registration Certificate	Yes [ ] Specific description of the gauge use: _____	[ ] Not applicable _____ [ ] Uses are: _____ (Submit safety analysis supporting safe use)
X		Cesium-137	Sealed source manufacturer or distributor and model number: See Attached Device manufacturer or distributor and model number: See Attached	Not to exceed either the maximum activity per source or maximum activity per device as specified in Sealed Source and Device Registration Certificate	Yes [X] Specific description of the gauge use: See Attached	[ ] Not applicable _____ [ ] Uses are: _____ (Submit safety analysis supporting safe use)

Yes	No	Radioisotope	Manufacturer or Distributor Model No.	Quantity	Use As Listed on SSD Certificate	Specify Other Uses Not Listed on SSD Certificate
	X	Americium-241	Sealed source manufacturer or distributor and model number: _____ Device manufacturer or distributor and model number: _____	Not to exceed either the maximum activity per source or maximum activity per device as specified in Sealed Source and Device Registration Certificate	Yes [ ] Specific description of the gauge use: _____	[ ] Not applicable _____ [ ] Uses are: _____ (Submit safety analysis supporting safe use)
X		Other Isotope (Specify): **Plutonium 238**	Sealed source manufacturer or distributor and model number: **See Attached** Device manufacturer or distributor and model number: **See Attached**	Not to exceed either the maximum activity per source or maximum activity per device as specified in Sealed Source and Device Registration Certificate	Yes [X] Specific description of the gauge use: **See Attached**	[ ] Not applicable _____ [ ] Uses are: _____ (Submit safety analysis supporting safe use)
	X	*Financial Assurance Required and Evidence of Financial Assurance Provided*				

Table B.2 Items 7 Through 11: Training and Experience, Facilities and Equipment, Radiation Safety Program, and Waste Disposal

Item No. and Title	Suggested Response	Yes	Alternative Procedures Attached
7. Individual(s) Responsible For Radiation Safety Program And Their Training And Experience 7.1 Radiation Safety Officer Name: John M. Given	Before obtaining licensed materials, the proposed RSO will have successfully completed the training described in Criteria in the section entitled "Individual(s) Responsible for Radiation Safety Program and Their Training and Experience - Radiation Safety Officer" in NUREG-1556, Vol. 4, dated October 1998. **AND** Before being named as the RSO, future RSOs will have successfully completed the training described in Criteria in the section entitled "Individual(s) Responsible for Radiation Safety Program and Their Training and Experience - Radiation Safety Officer" in NUREG-1556, Vol. 4, dated October 1998. Within 30 days of naming a new RSO, we will submit the new RSO's name to NRC to include in our license.	[X]	[ ]
7. Individual(s) Responsible For Radiation Safety Program And Their Training And Experience 7.2 Authorized Users	PROPOSED AUTHORIZED USERS: Before using licensed materials, authorized users will have successfully completed the training described in Criteria in the section entitled, "Authorized Users" in NUREG-1556, Vol. 4, dated October 1998.	[X]	[ ]
8. Training for Individuals Who in the Course of Employment are Likely to Receive Occupational Doses of Radiation in Excess of 1 mSv (100 mrem) in a Year (Occupationally Exposed Workers) and Ancillary Personnel	The applicant is *not* required to, and should not, submit is training program, for individuals who in the course of employment are likely to receive occupational doses of radiation in excess of 1 mSv (100 mrem) in a year (occupationally exposed workers) and ancillary personnel, to the NRC for review during the licensing phase.	Need Not Be Submitted with Application	

Item No. and Title	Suggested Response	Yes	Alternative Procedures Attached
9. Facilities and Equipment	We will ensure that the location of each fixed gauge meets the Criteria in the section entitled "Facilities and Equipment" in NUREG-1556, Vol. 4, dated ~~August~~ October 1998.	[X]	[ ]
10. Radiation Safety Program - Audit Program	The applicant is *not* required to, and should not, submit its audit program to the NRC for review during the licensing phase.	Need Not Be Submitted with Application	
10. Radiation Safety Program - Survey Instruments	Surveys pursuant to 10 CFR 20.1501 will be performed by a person specifically authorized by the NRC or an Agreement State to perform these surveys. **OR** We will use instruments that meet the Criteria in the section entitled "Radiation Safety Program - Instruments," in NUREG-1556, Vol. 4, dated ~~August~~ October 1998, and *one* of the following: Each survey meter will be calibrated by the manufacturer or other person authorized by the NRC or an Agreement State to perform survey meter calibrations. **OR** We will implement the model survey instrument calibration program in Appendix I to NUREG-1556, Vol. 4, dated ~~August~~ October 1998.	[X]	[ ]
10. Radiation Safety Program - Material Receipt and Accountability	Physical inventories will be conducted at intervals not to exceed 6 months or at other intervals approved by the NRC, to account for all sealed sources and devices received and possessed under the license.	[X]	[ ]
10. Radiation Safety Program - Occupational Dosimetry	We will perform a prospective evaluation demonstrating that unmonitored individuals are not likely to receive, in one year, a radiation dose in excess of 10% of the allowable limits in 10 CFR Part 20 or we will provide dosimetry that meets the Criteria in the section entitled "Radiation Safety Program - Occupational Dosimetry," in NUREG-1556, Vol. 4, dated ~~August~~ October 1998.	[X]	[ ]

Item No. and Title	Suggested Response	Yes	Alternative Procedures Attached
10. Radiation Safety Program - Public Dose	The applicant is not required to submit a response to the public dose section during the licensing phase. However, during NRC inspections, licensees must be able to provide documentation demonstrating, by measurement or calculation, that the total effective dose equivalent to the individual likely to receive the highest dose from the licensed operation does not exceed the annual limit for individual members of the public.	Need Not Be Submitted with Application	
10. Radiation Safety Program - Operating & Emergency Procedures	If the gauge meets one or more of the safety conditions specified in "Discussion," in the section entitled "Radiation Safety Program-Operating Emergency Procedures," in NUREG 1556, Vol. 4, dated ~~August~~ October 1998 state the following: Operating and emergency procedures will be developed, implemented, maintained, and distributed, and will meet the Criteria in the section entitled "Radiation Safety Program - Operating and Emergency Procedures," in NUREG-1556, Vol. 4, dated ~~August~~ October 1998. For each gauge requested that does not meet one or more of the safety conditions specified in "Discussion," in the section entitled "Radiation Safety Program-Operating Emergency Procedures," in NUREG 1556, Vol. 4, dated ~~August~~ October 1998 provide your operating, emergency and lock-out (if applicable) procedures to NRC for review.	~~[ ]~~ [X] [ ] Procedures Attached	[ ]
10. Radiation Safety Program - Leak Test	Leak tests will be performed at intervals approved by the NRC or an Agreement State and specified in the Sealed Source and Device Registration Certificate. Leak tests will be performed by an organization authorized by NRC or an Agreement State to provide leak testing services for other licensees or using a leak test kit supplied by an organization authorized by NRC or an Agreement State to provide leak test kits to other licensees and according to the kit supplier's instructions. **OR** We will implement the model leak test program published in Appendix M to NUREG-1556, Vol. 4, dated ~~August~~ October 1998.	[X] [ ]	[ ]

Item No. and Title	Suggested Response	Yes	Alternative Procedures Attached
10. Radiation Safety Program - Maintenance	ROUTINE MAINTENANCE We will implement and maintain procedures for routine maintenance of our fixed gauges according to each manufacturer's or distributor's written recommendations and instructions. NON-ROUTINE MAINTENANCE OPERATIONS The gauge manufacturer, distributor or other person authorized by NRC or an Agreement State will perform non-routine operations such as installation, initial radiation survey, repair, and maintenance of components related to the radiological safety of the gauge, gauge relocation, replacement, and disposal of sealed sources, alignment, or removal of a gauge from service.	[ ] [X]	[ ] [X] The information listed in Appendix N supporting a request to perform non-routing operations in-house is attached
10. Radiation Safety Program - Transportation	The applicant is *not* required to submit its response to transportation during the licensing process; this issue will be reviewed during inspection. However, the licensee should develop, implement, and maintain transportation procedures according to NRC and DOT regulations.	Need Not Be Submitted with Application	
10. Radiation Safety Program - Fixed Gauges Used at Temporary Job Sites	This is not applicable to our program. We will not use fixed gauges at temporary job sites. **OR** We will develop, implement, maintain and distribute procedures that meet the Criteria in the section entitled "Radiation Safety Program - Fixed Gauges Used at Temporary Job Sites" in NUREG-1556, Vol. 4, dated ~~August~~ October 1998.	[X] Not Applicable [ ]	 [ ]
10. Radiation Safety Program - Minimization of Contamination	The applicant is not required to submit a response to minimization of contamination if the applicant's responses meet the criteria for the following sections: Radioactive Material - Sealed Sources and Devices, Facilities and Equipment, Radiation Safety Program - Operating and Emergency Procedures, Radiation Safety Program - Leak Testing, and Waste Management - Gauge Transfer and Disposal.	Need Not Be Submitted with Application	

Item No. and Title	Suggested Response	Yes	Alternative Procedures Attached
11. Waste Management - Gauge Disposal & Transfer	The applicant is not required to submit a response to waste management during the licensing process. However, the licensee should develop, implement, and maintain gauge transfer and disposal procedures in its radiation protection program.	Need Not Be Submitted with Application	

5 a. Element & Mass Number	5 b. Chemical and/or Physical Form	5 c. Maximum activity to be possessed at any one time
A. Cs-137	A. Any sealed source registered pursuant to 10 CFR 32.210 or an equivalent Agreement State regulation.	A. As needed. See Item 6 A.
B. Pu-238-Be	B. Sealed source encapsulated as Pu-Be (Monsanto Research Corp. Dwg. DOMISC-2001) Texas Nuclear Drawing HMC-C-1049.	B. One source not to exceed 2.9 grams.
C. Pu-238-Be	C. Sealed source (Monsanto Research Corp. neutron source)Texas Nuclear Model No. HMC-C-1047	C. One source not to exceed 0.5 grams.

Keewatin Taconite will restrict the possession of licensed material to quantities below the minimum limit specified in 10 CFR 30.35(d) that would require financial assurance for decommissioning.

6. Purpose for which licensed material will be used:

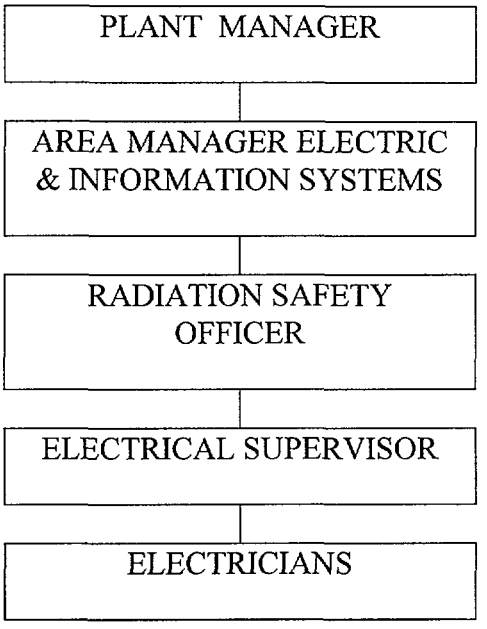
A. For use in compatible fixed gauging devices that are registered pursuant to 10 CFR 32.210 or an equivalent Agreement State Regulation for measuring the density and/or level of iron ore and slurry.

B. To be used in Texas Nuclear Corporation NOLA (Neutron On-Line Laboratory Analysis) system for sample analysis.

C. To be used in Texas Nuclear Corporation Neutron Activation Laboratory Analysis System (NALA) for sample analysis.

7. **Individual(s) responsible for the radiation safety program and their training and experience.**

The following organizational chart reflects the corporate structure as it relates to radiation safety and the radiation safety duties and responsibilities.



John M. Given, Radiation Safety Officer

Mr. Given's training documentation is included as Appendix A. His duties and responsibilities will include those listed in the section titled "Individual(s) Responsible for Radiation Safety Program and Their Training and Experience – Radiation Safety Officer" in NUREG-1556, Vol. 4, dated October 1998. He retains final authority over all activities involving radiation and the uses of radioactive material.

8. Training For Individuals Working in or Frequenting Restricted Areas

The current license authorizing activities at Keewatin Taconite does not list authorized users by name. Licensed activities will be under the supervision of the Radiation Safety Officer or a designated authorized user. Before being allowed to use licensed materials, authorized users will have successfully completed the training described in Criteria in the section entitled, "Authorized Users" in NUREG-1556, Vol. 4, dated October 1998. Records of these individuals and their training will be kept on file.

9. Facilities and Equipment

The structural facilities of Keewatin Taconite are located at Minnesota Ore Operations, Division of U. S. Steel, One Mine Road, Keewatin, MN and have been in existence for many years. The devices possessed and used have also been on site for many years.

The gamma devices containing radioactive material are installed on pipes or vessels throughout the plant and are used to make density, level or mass flow process measurements. The Texas Nuclear NOLA system and the Texas Nuclear NALA are located in laboratories. Exact location of each fixed gauge and the analysis systems is maintained on our physical inventory form. Both the inventory location records and drawings are available to site and emergency personnel.

These gauges are located in areas not considered working areas and are oriented so the open shutter beam minimizes radiation on walkways. These walkways are not for constant traffic, but are used only to reach other equipment during maintenance periods. These devices are located in areas with a temperature range of 50 degrees F to 100 degrees F, a dust laden non-corrosive atmosphere, and minor vibration. All conditions meet the vendor's recommendations.

If gauges need to be taken down for placement into storage, they are moved to a designated storage site. Access doors to this storage area are secured when not manned by authorized personnel and the area is appropriately marked.

10. Radiation Safety Program

It is the philosophy of Keewatin Taconite management to conduct all activities involving the use of radiation or radioactive material in such a manner as to maintain exposures to all individuals As Low As Reasonable Achievable. Likewise, it is the practice of Keewatin Taconite workers to perform all assigned duties in accordance with established procedures, and to immediately cease any activity which may appear to compromise good work or health and safety practices. Any such situation shall be immediately reported to the Radiation Safety Officer or his designee.

Program Audit - The Radiation Safety Program will be audited at intervals not to exceed one year and records will be maintained for inspection.

Survey Instruments – We will use instruments that meet the Criteria in the section entitled "Radiation Safety Program – Instruments," in NUREG-1556, Vol. 4 dated October 1998. Each survey meter will be calibrated annually by the manufacturer or other person authorized by the NRC or an Agreement State to perform survey meter calibrations.

Occupational Dosimetry – Occupancy studies have been performed and documented which demonstrate that unmonitored individuals are not likely to receive, in one year, a radiation dose in excess of 10% of the allowable limits in 10 CFR Part 20. Therefore, personnel monitoring is not utilized at this site. Should circumstances change in the future, we will provide dosimetry that meets the Criteria in the section entitled "Radiation Safety Program – Occupational Dosimetry," in NUREG-1556, Vol. 4, dated October 1998.

Operating & Emergency Procedures – have been developed, implemented, maintained, and distributed, and meet the Criteria in the section entitled "Radiation Safety Program – Operating and Emergency Procedures," in NUREG-1556, Vol. 4, dated October 1998.

Leak Tests will be performed at intervals approved by the NRC or an Agreement State and specified in the Sealed Source and Device Registration Certificate. Leak tests will be performed by an organization authorized by the NRC or an Agreement State to provide leak testing services for other licensees, or by using a leak test kit supplied by an organization authorized by the NRC or an Agreement State to provide leak test kits to other licensees and according to the kit supplier's instructions.

Non-Routine Maintenance Operations – Gamma Gauges:

We request continued authorization to be able to mount new devices containing radioactive material according to manufacturers' instructions. Additionally, we

request continued authorization for the Radiation Safety Officer, or properly trained individuals designated by the Radiation Safety Officer to perform or supervise the performance of selected licensed activities according to appropriate procedures in Appendix B. These activities shall include:

a. Radiological commissioning of devices including survey and leak test;
b. Take down of devices for placement into storage;
c. Relocation of devices containing radioactive material;
d. External maintenance and minor repair of devices as outlined in procedure titled Device Inventory and Inspection contained in Appendix B;
e. Checking the operability of the device ON/OFF mechanism.

Any maintenance or repair involving an internal shutter or removal and/or replacement of the radioactive material will be performed by the device manufacturer or by other persons specifically authorized by the Commission or an Agreement State to perform such services.

NOLA System

Initial installation and radiological commissioning of the NOLA System was performed by the device manufacturer.

Due to the nature of the NOLA system, in order to accomplish required maintenance resulting from a number of circumstances, it is occasionally necessary to perform irradiate cell check and removal. This activity has been authorized for many years and we request that the authorization be continued. We have updated the comprehensive step-by-step procedure by which this activity can be safely performed by properly trained and authorized individuals (see Silica Analyzer (NOLA) Servicing Procedure in Appendix B). Leak testing will be performed at six-month intervals utilizing an approved mailable kit.

NALA System

Initial installation and radiological commissioning of the NALA System was performed by the manufacturer. Generally, there is no routine maintenance required. Leak testing will be performed at six-month intervals utilizing an approved mailable kit.

11. Waste Management

No radioactive waste is generated by the material possessed or used at Keewatin Taconite. When the devices containing sealed sources are no longer needed, they will be transferred to the manufacturer or to other persons specifically authorized by the Commission or an Agreement State to perform such services. Records of all transfers will be maintained in the Decommissioning file.

APPENDIX A

TRAINING DOCUMENTATION FOR ITEM 7

Keewatin Taconite
October 2004

CERTIFICATE OF ATTENDANCE

JOHN M. GIVEN

has attended

RSO REFRESHER RADIATION SAFETY
(24 HOURS)

conducted by radiation technology, inc.

W. Hendricks

Instructor

Date October 8, 2003

radiation technology, inc.

RADIATION TECHNOLOGY, INC.
INDUSTRIAL RADIATION REFRESHER TRAINING
AGENDA

Atomic Structure

- Periodic Table of Elements
- Isotopes
- Characteristics of Radiation
  - Alpha Particles
  - Beta Particles
  - X and Gamma Rays
  - Neutrons
- Radioactive Decay
- Radioactive Material
- Half-Life
- Ionization

Units and Estimated Exposure

- Units
  - Roentgen
  - Rad
  - Rem
- Quality Factors
- Gamma Exposure

Shielding

- Inverse Square Relationships
- Alpha Radiation
- Beta Radiation
- Gamma Radiation
- Shield Materials
- Calculations for Shield Thickness

Biological Effects

- Radiosensitivity
- General Cell Structure
- Reproductive Activity
- Cellular Differentiation
- Radiation Exposure
- Organ and Tissue Effects
- Radiation Damage
- Biological Response to Whole Body
  - Acute Dose
- Internal Dosimetry
- Low Dose Radiation
- Long Term Effects

Radiation Protection Guides and Personnel Monitoring

- Radiation Protection Guides
  - Occupational Dose Limits
  - Members of the Public
  - Declared Pregnant Female
- Personnel Monitoring Requirements
- Personnel Monitoring Devices

Instrumentation

- Instrument Characteristics & Uses

Applications for Radioactive Material

- Uses of Radioactive Material
- Fixed Gauge Safety Considerations
- Gauge & Sealed Source Construction
- Portable/Laboratory Devices
- Posting Requirements

Radiation Protection Program

- License Conditions
- ALARA Program
  - Procedures
  - Records
  - Reporting
- Training Requirements
- Inspections

Transport of Radioactive Material

- **DOT Regulations and Requirements**
- **Proper Labeling and Paperwork**

Group and Class Discussion Problems

radiation technology, inc.

LETTER OF CERTIFICATION 40 hrs

This is to certify that

JOHN M. GIVEN
NATIONAL STEEL PELLET COMPANY

attended and successfully completed a course of instruction conducted under the auspices of Radiation Technology, Inc. January 10-14, 2000 and described in the attached course agenda. This course covers fundamentals of radiation, units of dose and quality of radiation fields, hazards of radiation exposure, detection devices, regulatory compliance, radiation safety program design and implementation, and specific training on installation, radiation surveys, and leak testing of devices containing radioactive material in sealed sources.

The said course of instruction, together with prior experience, is structured to qualify persons who complete it to understand and safely perform various operations involving nuclear devices including the installation, relocation and leak testing of such equipment. The operations are to be done in accordance with the rules and regulations of the United States Nuclear Regulatory Commission and/or "Agreement States," and are in all respects subject to such rules and regulations.

This letter cannot be used in lieu of a specific license from or other sanction by an appropriate regulatory agency.

Radiation Technology, Inc.

W. G. (Jack) Hendrick
Health Physicist

P O Box 27637 • Austin, Texas 78755 • (512) 346-7608 • Fax (512) 795-8718
8407 Skyline Avenue • Odessa, Texas 79764 • (915) 550-9701

RADIATION TECHNOLOGY, INC.
40-HOUR INDUSTRIAL RADIATION SAFETY TRAINING COURSE
AGENDA

Radioactive Materials
- A. Isotopes
- B. Decay
- C. Half-life

Types of Radiation

Radiation Interaction with Matter
- A. Ionizing Radiation
  - 1. Electromagnetic
  - 2. Charged Particle
  - 3. Neutron
- B. Specific Ionization

Radiation Dosimetry
- A. Units & Dose Determination
- B. Quality Factor
- C. Gamma Exposure Rate
- D. Neutron Exposure Rate

Shielding
- A. Inverse Square Law
- B. Time, Distance, Shielding
- C. Half-Value Layer
- D. Calculating Shield Thicknesses

Biological Effects
- A. Radiosensitivity
- B. General Cell Structure
- C. Radiation Exposure
- D. Radiation Damage
- E. Long Term Effects
- F. Dose Limits
- G. Total Accumulated Dose

Biological Effects (Con't)
- H. Radiation Protection Guides
- I. Natural Background Radiation
- J. Estimated Loss of Life Expectancy

Radiation Detection
- A. Detection Instruments
  - 1. Basic Operation
  - 2. Survey Meters

Personnel Monitoring
- A. Requirements
- B. Devices

Industrial
- A. Posting
- B. Industrial Device Installation
  - 1. Requirements
  - 2. Surveying & Leak Testing Demonstration

"Hands-On" Practical Session
- A. Check-out and re-briefing on use of portable radiation survey meters
- B. Survey a Fixed Gauge
- C. Prepare Survey Forms
- D. Leak Test Devices using Screening Procedure
- E. Count Swabs
- F. Prepare Leak Test Certificates

Regulatory Control

A. Title 10 Code of Federal Regulations
B. Agreement States
C. Licensing Procedures
D. General vs Specific License
E. User Responsibility
F. Radiation Protection Program
    1. Recordkeeping
    2. Posting
    3. Training
    4. Incident Reporting
    5. Emergency Procedures

Shipping Radioactive Material

Summary of Topics

A. Role of Radiation Safety Personnel
B. Class Discussion

Written Test on Lectures and Homework Assignments

Note: Homework is assigned each night during the course.

APPENDIX B

OPERATING & EMERGENCY PROCEDURES

Keewatin Taconite
October 2004

STANDARD EMERGENCY PROCEDURES INVOLVING DAMAGE TO FIXED NUCLEAR GAUGES

Approved: John M. Given

Last Revision: 10-6-04

Purpose:

The purpose of this procedure is to establish guidelines for response to potential incidents or accidents. Emergency procedures are to be instituted at the time of an incident involving devices containing radioactive material.

1. First deal with the emergency: put out the fire, render first aid, etc. Then remove emergency response personnel from the area until the RSO can assess radiological conditions.

2. Immediately notify the RSO or his designee of any incident involving a device containing radioactive material.

3. Control access to the immediate area around the device until the RSO or his designee arrives.

4. Upon arrival, the RSO or his designee will review the situation to determine the extent of the emergency; and immediate steps to be taken to protect personnel from potential unnecessary exposure.

5. In the case of a dislocated source head, the shutter will be closed, if possible; and a visual inspection completed to determine physical damage to the device. If the shutter cannot be closed, the beam will be shielded as efficiently as possible until additional measures can be taken. A survey will be completed to determine potential exposure levels around the device. Personnel other than those working with the device will be directed away from the immediate area. The RSO or his designee will supervise movement of the device to the storage area where it will be maintained until arrangements can be made for repair and reinstallation.

   If there is reason to believe the source has been dislodged from the source head, the RSO will conduct a search using a survey meter. The search will start at the last known location of the source and proceed outward in ever expanding circles.

6. If the device is directly involved in a fire or explosion, the RSO or his designee will provide emergency response personnel with information regarding the locations of gauges, isotopes and activities involved. After the immediate threat of fire, etc. has been resolved, the shutter will be closed, if possible; a visual inspection will be completed; and a radiation survey performed to determine potential exposure levels in the immediate area. If necessary, the area will be controlled and properly posted until steps can be taken to affect any necessary repairs, or until the device can be relocated to a storage area.

7. Personnel involved in the emergency will be interviewed to obtain information for estimating their potential exposure.

8. The RSO will complete paperwork documenting the incident and procedures completed on site; and make any required notifications in a timely fashion.

KEEWATIN TACONITE.

INSTALLATION AND COMMISSIONING PROCEDURE

Approved By: John M. Given

Last Revision Date: 10-6-04

Purpose:

The purpose of this procedure is to provide guidance for the safe installation and commissioning of devices containing radioactive material, in compliance with Keewatin Taconite specific license conditions.

1. The authorized individual who intends to move or supervise the movement and mounting of the device will obtain a copy of the manufacturer's mounting procedures. The current regulatory position requires that for this authorization, Keewatin Taconite will agree to follow these mounting procedures and ensure that the instructions are maintained in a file for future inspection by regulatory agency personnel.

2. Following the manufacturer's procedures, the device will be moved to its appropriate location and securely mounted. No disassembly of the source containing portion, if separate, is allowed. If this is a two component system, the detector can be wired and powered following mounting.

3. Upon completion of the physical installation, the authorized individual shall remove the shipping bolt from the device shutter; perform a leak test; and complete a radiation survey of the device.

4. Documentation of the leak test results and radiation survey shall be reviewed and maintained by the Radiation Safety Officer.

NUCLEAR DEVICE INVENTORY AND INSPECTION

Approved By: John M. Given

Last Revision Date: 10-6-04

Purpose:

This procedure is designed to facilitate completion of the Keewatin Taconite semi-annual inventory and inspection of devices containing radioactive material.

A. A physical inventory and inspection of each device containing radioactive material will be performed by authorized Keewatin Taconite personnel once every six months.

B. Inventory records will include:

The manufacturer, model and serial number of each device containing radioactive material;
The radionuclide and its activity;
The location of each device;
The date of the inventory;
The signature of the radiation safety officer or designee completing the inventory.

C. Check all tags and labels on the gauging device to make sure they are legible.

D. If the tag or label is illegible, it must be replaced. New replacement tags should be ordered from the manufacturer.

E. Check the operation of the device shutter. If it does not operate freely, clean, lubricate, and try to free it up. If the shutter will not move, notify the RSO.

F. If the housing shows signs of significant rust or corrosion, it can be repainted making certain labels and the tag are taped prior to doing so. Additionally, one should use care around the shutter to ensure that paint does not inhibit shutter movement.

G. Maintenance items identified during routine inspections will be logged by the RSO or his designee and forwarded to the proper department for action. Completed forms will be returned to the RSO, after maintenance requests have been fulfilled.

H. Completed inventory/inspection forms will be provided to the RSO for his review prior to filing.

I. Records will be maintained for a minimum of two years or as specified in the Keewatin Taconite specific license.

LEAK TESTING PROCEDURE

Approved By: John M. Given

Last Revision Date: 10-6-04

Purpose:

Periodic leak testing of devices containing radioactive material in sealed sources is required at specified intervals to determine the presence or absence of contamination. The purpose of this procedure is to provide guidelines for compliance with the Keewatin Taconite specific license conditions as they deal with leak testing.

1. Leak testing will be completed using approved mailable kits provided by vendors specifically licensed by the U.S. Nuclear Regulatory Commission or an Agreement State.

2. Wipes shall be taken by properly trained Keewatin Taconite personnel, or another qualified party, in accordance with appropriate instructions.

3. When using mailable kits, the wipes shall be analyzed by the vendor, and the vendor shall provide certification of the analysis for each device to the Keewatin Taconite RSO.

4. Leak test documentation shall be maintained by the RSO.

KEEWATIN TACONITE

NUCLEAR DEVICE LOCKOUT PROCEDURE

Approved By: John M. Given

Last Revision Date: 10-6-04

Purpose:

If, for any reason, a nuclear device needs to have the shutter closed and locked, the following procedure is to be followed:

1. Contact the Radiation Safety Officer (RSO), John M. Given, or the Instrument Shop and make a request to have a shutter closed and locked. It is not required that the RSO be present for lockout.

2. An authorized Technician will close the gauge shutter and verify proper operation with a survey meter. The authorized Technician will then lock the shutter in the closed position using a nuclear gauge lock. The RSO will make a note to file that the shutter was closed and locked, including the reason for doing so.

3. When work is completed, contact the RSO or the Instrument Shop and make a request to have the shutter unlocked and opened.

4. An authorized Technician will unlock and open the gauge shutter. The RSO will make a note to file that the gauge was returned to normal service.

PROCUREMENT OF RADIOACTIVE MATERIAL

Approved By: John M. Given

Last Revision Date: 10-6-04

Purpose:

Keewatin Taconite routinely uses devices containing sealed radioactive sources in various applications throughout the plant site. It is important that the Radiation Safety Officer be aware of any devices or any activity involving the use of radioactive material, prior to that material being brought on site; and that the RSO or his designee handles the receipt of such materials.

A. Personnel who expect to order any product containing radioactive material shall contact the RSO in advance.

B. The potential purchaser should send information to the RSO prior to placing an order for radioactive material. As a minimum, this information shall include:

*	Vendor and Contact Person	*	Activity
*	Product Model Number	*	Intended Use
*	Isotope	*	Date Required

C. The RSO will review the request to determine if possession of the radioactive material is currently authorized under Keewatin Taconite's specific license, or if a license amendment must be secured.

The request will be reviewed for completeness of information, enabling the RSO to resolve early on, incomplete facts regarding the intended use, design or integrity of the device. In addition, the RSO will determine or obtain:

a. The leak test frequency
b. Mounting requirements/arrangement

D. Once satisfied all information is complete, the RSO will sign and forward the request to the Purchasing Department. The purchase order will be submitted to the appropriate vendor. No device containing radioactive material will be ordered, received or released to any user on Keewatin Taconite property, without this procedure having been followed.

E. Any purchase requisition for devices containing radioactive material received in Purchasing without the RSO's approval will be returned to the RSO for approval prior to being processed.

RECEIPT OF RADIOACTIVE MATERIAL

Approved By: John M. Given

Last Revision Date: 10-6-04

Purpose:

To provide information regarding the safe receipt of devices containing radioactive material as sealed sources.

A. Immediately upon receiving a radiation source, receiving personnel are to contact the Radiation Safety Officer to insure the safe receipt of the gauge.

B. The shipping box or crate must be visually inspected by receiving personnel and the RSO to determine if any damage has occurred during transport. The RSO will conduct a radiological survey to determine the radiation field in the area of the shipping container.

C. The outer covering of the box or crate is to be removed but the gauge is to remain attached to the skid base. Again, visual inspection will be conducted checking for possible transport damage, status of the shutter locking mechanism and correctness of labeling.

D. Conduct another brief radiation survey to insure the security of the source and shutter.

E. If damage is evident, the source unit is to be isolated and leak tested for contamination. Damage or any degree of contamination precludes installation and the supplier of the unit will be notified immediately. Following an inspection which does not indicate any problems the device may be transported to the mounting location. The RSO or his designee should accompany the device to insure safe transport. The RSO will assemble receiving documentation for company records, along with the transport papers and leak test certificate which should accompany the device.

KEEWATIN TACONITE

NUCLEAR GAUGE REMOVAL PROCEDURE

Approved By: John M. Given

Last Revision Date: 10-6-04

Purpose:

If, for any reason, a nuclear device needs to be physically moved from its location, the following procedure is to be followed:

1. Make the request for removal of the device directly to the Radiation Safety Officer (RSO). Our license requires the RSO or an authorized user to be present for the removal of a nuclear device from service.

2. The RSO will contact the Instrument Shop and schedule the work to be done.

3. One of the authorized users will verify that the shutter on the source assembly works properly. This verification will be made with a survey meter.

4. Once proper operation of the shutter has been verified, the authorized user will close and lock the shutter with a nuclear gauge lock and remove the gauge from service. If the gauge is being moved to a new location, the authorized user will immediately do so. If the gauge is being removed for maintenance work and will be returned to the same location, the authorized user will move the gauge to the designated storage area until the maintenance work is completed. The RSO will make a note to file that the gauge was removed from service and moved to a new location and the reason for doing so. Inventory records will be updated with the new location.

5. Once the gauge is returned to service, another radiation survey and a leak test will be performed by the authorized user to verify that the source assembly was not damaged during the installation process. The RSO will make a note to file that the gauge was returned to service and verification that a radiation survey and leak test were performed.

RADIATION SURVEY PROCEDURE

Approved By: John M. Given

Last Rivision Date: 10-6-04

Purpose:

Radiation fields are measured as a part of gauge relocation procedures; to help in assessing occupancy factors for personnel who work in or near areas where gauges are located; to determine the transport index prior to shipping packages containing radioactive materials; and in emergency response situations. This procedure is designed to facilitate the efficient and timely completion of surveys when they are required.

1. Prior to performing radiation measurements, personnel will review the techniques for proper use of survey instrumentation listed in "Survey Techniques and Pointers," which is a part of this procedure. A field verification test will also be performed, if appropriate.

2. Appropriate survey meters are always available through the RSO. The meters will be calibrated as required, by authorized individuals; and calibration documentation will be maintained by the RSO.

3. The radiation survey will be made by an authorized user using the appropriate survey pattern sheet.

4. Assess radiation levels around the installed device. Check the installation for additional shielding or any signage which may be necessary.

5. The original survey sheet will be forwarded to the RSO to be placed in the proper file.

6. Return the survey meter to its storage location.

SURVEY TECHNIQUES AND POINTERS

1. Response Check

Prior to making any measurement with a survey meter, a brief inspection and test will be performed to verify its functionality. The following steps will ensure a correctly operating unit. Once again, there is no substitute for familiarity with the meter for quickly recognizing irregularities.

* Visually inspect the meter for damage. Look for loose cable terminations, broken switches and other gross physical damage.
* Check the calibration date for currency. This is more important from a statutory than physical standpoint, as a meter past its due date may be perfectly well calibrated.
* Turn on the meter and allow the circuit to stabilize.
* Test the battery using the built-in battery check scale.
* Verify the response of the instrument using the manufacturer supplied check source (if available).

2. Survey Techniques

The following tips and techniques will increase the quality of your radiation measurements, while increasing your confidence in the meter.

* Allow sufficient time for the meter to stabilize, and select a time constant appropriate to the measurement.
* Start surveying on a high range and work down to the lowest range practicable.
* When surveying for loose contamination, move slowly enough to accommodate the instrument's response time.
* Most meters have audio or earphone capabilities; they can be useful in low light or awkward conditions.
* Surveying radiation types or energies different from those for which a meter was calibrated can give false readings - make certain you know the energies with which you are working.
* Be aware that changing source - detector geometries can change readings dramatically - work for reproducible geometries.

PACKAGING AND TRANSPORT OF DEVICES CONTAINING RADIOACTIVE MATERIAL

Approved By: John M. Given

Last Revision Date: 10-6--04

Purpose:

Keewatin Taconite occasionally ships devices containing radioactive material in sealed sources. The purpose of this procedure is to provide information for proper preparation of packages for transport on public roadways.

1. The Radiation Safety Officer (RSO) will be advised prior to any shipment of devices containing radioactive material.

2. A copy of the consignee's authority to possess the type, form and quantity of material being transferred must be in the possession of the RSO prior to shipment.

3. The RSO will ensure that the outgoing shipment is adequately shielded, contained, and identified. Packaging and labeling of radioactive material shall be in compliance with applicable DOT regulations. Two sets of completed paperwork will be provided to the common carrier driver prior to leaving the site.

4. The RSO will provide technical service or assistance as necessary during any phase of the package preparation; and shall sign all shipping documents pertaining to radioactive materials. Further technical assistance, labels, sample documentation, etc., can be obtained from the licensed entity receiving the material.

5. All devices containing radioactive material transported on a public roadway (even in a company vehicle) must be properly labeled, identified and packaged for transport.

PROCEDURES FOR SILICA ANALYZER (NOLA) SERVICING

Approved By: John M. Given

Last Revision Date: 10-08-04

The purpose of these procedures is to address radiological health and safety issues, and provide step-by-step operating instructions so any properly trained individual can safely work with the silica analyzer.

SECTION I: Repair of Density Gauge Assembly

This section is to be followed when one must work inside the density gauge enclosure. The density gauge assembly consists of the density gauge detector, the preamp, secondary and primary collimators mounted on a base plate. This assembly is mounted inside a NEMA enclosure; with a density gauge source head containing Cs-137 mounted on the outside of the same enclosure.

1. Place the NOLA system in a stand-by or off-line mode.

2. Open the main valve and flush valve to remove material from the analysis loop.

3. Switch the pump, agitator and all valves Off.

4. Switch the high voltage (H.V.) power supply Off.

5. Switch the element and density stabilizers to Calibrate, if applicable.

6. CAUTION: No work will be done on the density gauge assembly unless the source shutter on the density gauge head is closed and locked in the Closed position. A survey meter calibrated to measure high energy gamma radiation will be used to confirm that the shutter has closed. Readings will be taken near the entry port where the radiation beam would enter the NEMA enclosure; and generally will be <10 mR/h. CAUTION: Electrical power to the system must be removed because the line voltage is exposed within the NEMA enclosure.

Removal of the Density Gauge Detector Assembly

1. With the H.V. off, disconnect all coax connectors at the preamp assembly.

2. Remove the screws holding the preamp and detector clamps.

3. With the density gauge head shutter closed, there is no significant radiation field inside the detector assembly during this operation.

4. Gently remove the detector and preamp assembly for any repair.

SECTION II: Replacement of Analysis Loop Tubing in Density Gauge

Work on the analysis loop tubing can proceed after Steps 1 through 6 of Section I have been completed.

1. Disconnect the analysis loop tubing at the bulkhead connectors located on the inside of the NEMA enclosure.

2. Remove the allen head bolts and the top half of the lead collimator. Remove the old section of tubing and clean any spill.

3. NOTE: Do not loosen or remove the bottom half of the lead collimator or change the location of the secondary collimator.

4. Install a new section of tubing, of comparable length, in the bottom lead collimator and install the top half loosely.

5. Adjust the loops in the tubing section until they are just below the level of the top of the NEMA enclosure lid when closed.

6. Replace and secure the top half of the lead collimator.

7. Install the tubing and test for leaks.

SECTION III: Count Cell and Detector Assembly

Any irradiated slurry in the sampling lines may contain some low-level radioactive material. The lines are to be disconnected when the count cell or detector assembly is to be removed. As the lines are disconnected from the bulk head connections, flush them and catch any irradiated slurry. The slurry should then be deposited in a process wastewater drain and the pan washed out.

SECTION IV: Holding Tank Assembly & Associated Lines

Radiation exposure associated with the holding tank assembly and lines is minimal and there should be no buildup of radioactive material in the holding tank.

1. Place the NOLA system in a stand-by or off-line mode.

2. Open the main valve and flush valve to remove material from the analysis loop.

3. Switch the pump, agitator and all valves Off.

4. Disconnect the lines from the holding tank and dispose of any process slurry in a process wastewater drain.

SECTION V: Primary Neutron Source Shield

The neutron source shield is typically filled with water containing a corrosion inhibitor. The proper water level in the shield should be indicated by a conductive level probe, float switch or other appropriate device, and should be maintained at that indicated level. There will be no radioactive build-up in the water or outer source shield. Both neutron and gamma radiation levels are well known around the shield; with gamma radiation fields typically the higher.

The inner source shield is a right circular cylinder containing the encapsulation cell, and is filled with oil. No particular oil is specified, other than it should be relatively clear for visual inspection. If a leak develops between the inner shield and the outer water shield, oil will be displaced and may float out onto the surface of the tank water.

There is no need to run neutron surveys around the outer source shield. These radiation levels are well known and are <1 mrem/h everywhere on the surface of the tank. Typical readings at the top of the column of oil would be in the range of 0.02 - 0.03 mrem/h. Readings on the side of the tank at the pump, for example, are typically around 0.4 - 0.7 mrem/h. Gamma radiation fields at the same points typically exceed these levels by a factor of two to as much as a factor of ten. Total dose levels are still very low, but the gamma fields contribute a much greater proportion than the neutron dose.

SECTION VI: Activation Analysis Irradiate Cell Check and Removal Procedure

The process flow system includes pumps, lines, the cell, its encapsulation, and the oil shield. The following will be utilized to verify the integrity of all parts of the system except the irradiate cell and its encapsulation.

1. Place the NOLA system in a stand-by or off-line mode.

2. Open the main valve and empty water from the analysis loop.

3. Switch the pump, agitator and all valves to Off.

4. Visually inspect the system to determine what has failed, e.g., the pump, tubing, or the cell.

5. Proceed with the visual inspection by loosening the cable lock and ring and visibly inspecting the oil bath and tubing. The cell top cover is retained with six hex head screws. Removing these screws and gently lifting up on the top cover allows for the inspection of the bulkhead fitting on the under side of the top cover plate. If the break has occurred outside the encapsulation cell, where it is visible, one can often simply reconnect the tubing section. If the separation occurs inside the cell encapsulation, cell removal is the only way to effect repair. In either case, reinstall the cell top cover. It must be in place before one can exert upward pressure on the cell itself.

Encapsulation and Cell Removal

1. Cover a work area on top of the tank with an oil absorbent material.

2. Position a plastic pan nearby so the encapsulation cell can be lifted up through the oil and placed in the pan with little spillage. Handle the cell with rubber gloves which can be easily washed.

3. Attach an appropriate lifting device to the eye-bolt on the encapsulation cell cover. Remove the cable lock and bolts from the inner source shield cover.

4. The encapsulation cell will act like a hydraulic piston in the oil column. Therefore, it must be removed slowly so the oil can drain past the encapsulation cell column as the cell is moved upward. Monitoring the oil level at the top will indicate how fast the cell may be raised. If one must gently shake or rotate the cell to get it to move upward freely, always remove the cell in a counter-clockwise direction as one would view a clock looking down on the oil bath from the top of the tank. The encapsulation cell will also be full of oil. This oil should be allowed to drain either into the column or a container, before the cell is placed in the pan.

   If one has access to an appropriate neutron survey meter, then the source position can be verified during cell removal. However since the cell contains radioactive material, a gamma survey meter will see significant increases in the radiation field as the encapsulation cell moves upward. This does not mean the source is moving. When the encapsulation cell clears the tank, visually inspect the bottom to ensure that the source has remained in the oil column. If there is any reason to believe the source itself has moved, stop the operation and notify the RSO. Don't proceed with any disassembly until any problem is resolved.

5. The cell and plastic pan will be moved off the tank and temporarily stored nearby to allow for decay of the radioactive buildup. Decay of most radioactive buildup will be very rapid. Measure the radiation exposure rates close to the surface of the encapsulation cell. One can safely proceed with disassembly of the encapsulation cell when radiation levels are <10 mR/h. If time is not of the essence, then radioactive decay can be allowed to continue as long as is desirable. If the encapsulation cell assembly is to be stored for any extended period of time; one must flush the cell with water to clear any accumulated slurry and deposit the residue in a process drain.

6. Disassembly of the encapsulation cell and its cleaning will be done in accordance with instructions in the manual provided by the manufacturer. This basically involves pulling screws, lifting the glass cell out and flushing with water. However, the actuate cell is glass and very fragile, particularly at points of contact with the cell cover fittings.

7. The cell and tubing can be replaced or repaired with extremely low radiation exposure, but its construction demands extreme care in assembly and disassembly.

8. Residual waste slurry and cleaning water should be washed to a process drain. Do not flush down a sanitary sewer drain. Residual oil will be disposed in accordance with plant procedures for hydrocarbon disposal.

9. If it is necessary for the oil column to be cleaned of slurry before the cell and its encapsulation assembly are reinserted, it can be done with water. As the slurry and oil mix is being pumped from the oil column, add water to maintain a shield level. If the water combination is maintained within one foot of the top of the column, it will provide a shield factor of at least 120. Neutron doses should not exceed 0.1mrem/h, and gamma exposure should not exceed 1 mrem/h; for a total dose (conservatively) of approximately 1.1 mrem/h. After the column is cleaned, the oil can be added back as the water is pumped out.

SECTION VII: Cleaning of the Inner Source Shield and Encapsulation Assembly

The encapsulation assembly can be disassembled and flushed with water. The assembly is made of glass and is very fragile, so this procedure must be done very carefully. Slurry from the assembly will be disposed down a process wastewater drain. Residual slurry in the inner column can be pumped out. This is best done by pumping out oil while inserting water. The oil can be reclaimed, i.e., it can be easily filtered and reused, but should not be disposed in a process drain. Once the inner column is clean, it must be refilled with oil, again to about one foot from the top; before the encapsulation cell assembly is lowered into place.

1. When the encapsulation assembly is properly installed, the distance from the top of the encapsulation cell cover to the top of the inner source shield cover should be approximately 15/16 inch.

2. After the cell is seated over the neutron source holder, top-off the oil bath level to within 1-2 inches from the top of the cell.

3. Reconnect the loop tubing; pump water through the lines; and check for leaks.

4. Secure the inner source shield cover with the lock ring screws and locking cable.

SUMMARY OF RADIATION SAFETY INFORMATION

A. NOLA Density System

1. Cs-137; 500 mCi in a lead-filled source head.

2. Results of the radiation survey completed at the time of installation must be maintained on file for inspection. Radiation surveys need not be repeated unless the device is removed from its installed position.

3. Leak test once every three years using an approved procedure.

4. Ensure that the source shutter is closed during any maintenance on the enclosed electronics. One or two survey readings inside the electronics box are appropriate since the shutter is enclosed.

B. Activation Analysis System

1. Pu-238-Be emitting 1.1×10^8 n/sec.

2. The initial radiation survey and the manufacturer supplied drawing showing both neutron and gamma levels should be maintained on file together.

3. The license issued for possession of the unit will require leak testing for the Pu-238-Be source at least once every 6 months.

4. Radiation fields under normal conditions of use are very low.

5. The source is threaded with counter-clockwise threads on a plate at the bottom of the oil bath.

6. Loss of the entire water shield may not preclude repair to a leaking tank with the source cell and oil column in place. The maximum radiation levels without water in the tank would be 15-20 millirem per hour at the tank surface on the closest side.

7. The slurry loop will be flushed, if possible, with water prior to any shutdown of the pump or external sampling systems to preclude slurry from settling around the source for a long period of time.

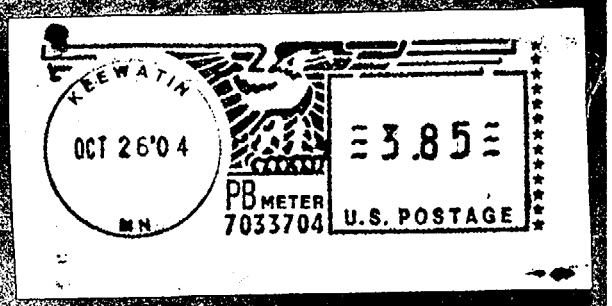
8. Failure of the tubing or the glass irradiate cell can require removal of the cell and cell container for repair. The cell, any slurry, and the cell encapsulation will all have some level of radioactivity in or on them from being near the neutron source. Any loose slurry may be slightly radioactive and therefore the cell should be treated as having surface contamination. All loose slurry should be flushed into a process wastewater drain.

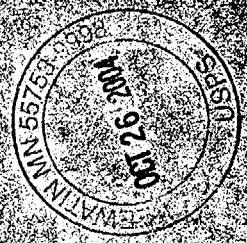
   The activation products buildup will not create radiation fields that are high in terms of significant dose. However, one should monitor these radiation fields with a standard GM tube when handling the irradiate cell. Gloves must be worn during handling, and the gloves and hands washed upon completion. All components will be cleaned and stored until re-assembly. Any residual slurry should simply be washed off and down a process wastewater drain.

9. The silica analyzer has been surveyed for neutron dose. Even though the doses are very low, all individuals directly assigned to this kind of work are to be considered occupationally exposed because the classification depends on work assignment, not dose levels. Neutron doses are typically 1/10 - 1/100 of the gamma doses at any point, even at the surface.

10. The principle radioisotope made in the steel construction of all components is Fe-55 formed from Fe-54(n,γ)$\rightarrow$Fe-55. The total energy available from Fe-55 disintegration is approximately 5.9 keV. It is extremely low and offers little possibility of dose to live tissue. The primary source of gamma radiation is the irradiated slurry containing the short lived isotope of aluminum and gammas formed both from production of neutrons at the source and their capture in hydrogen. The radioactive material content of the irradiate cell encapsulation assembly should decay very rapidly in time.

KEEWATIN TACONITE
X 217
IN, MN 55753





MATERIALS LICENSING BRANCH
U.S. NUCLEAR REGULATORY COMMISSION
REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, IL 60532-4352